

## Worksheet #1 on Exponents

Here are the rules of indices (or powers, or exponents) that we met in class:

$$a^0 = 1$$

$$a^1 = a$$

$$a^m = \underbrace{a \times a \times a \times a \times \dots \times a \times a}_m \text{ (where we have } m \text{ a's all multiplying out)}$$

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

$$a^{-n} = 1/a^n$$

$$a^{1/n} = \sqrt[n]{a}$$

1. Simplify the following, giving your answer in the form  $a^n$  (n doesn't have to be a whole number, but a should be):

(a)  $2^3 \times (2^7)^2$       (b)  $\sqrt{3} \div 3^{-1}$       (c)  $(0.2)^4$       (d)  $90^0 \times 2^3$       (e)  $\sqrt[3]{4} \div 4$

2. Simplify the following, giving your answer in the form  $a^n$ :

(a)  $4^{2n+1} \times 4$       (b)  $5^{1-n} \div 5^3$       (c)  $8^{0.5} \times 8^n$       (d)  $\frac{6^{2n+1}}{6^{1-3n}}$

(e)  $2^n \times 3^n$       (f)  $2^{2n} \times 35^0$       (g)  $(3^{n+1})^2$

3. Simplify the following, giving your answer in the form  $a^n$ :

(a)  $2^3 \times 4^3$       (b)  $32^2 \div 8^{-3}$       (c)  $125^{0.1} \times 25^{0.2} \times 5^{0.3}$       (d)  $81^3 \div 3^5 \times 27^2$

(e)  $\sqrt[3]{4} \times \sqrt[4]{8}$       (f)  $64^{-1} \times 128^{0.5}$

4. Solve the following equations for x:

(a)  $2^x = 32$       (b)  $2^{x-1} = 32$       (c)  $2^{0.5x} = 32$       (d)  $2^{1-x} = 32$       (e)  $2^{1-x} = \sqrt{32}$

5. Solve the following equations for x:

(a)  $2^x = 4^{2x}$       (b)  $2^x = 4^{x+1}$       (c)  $2^{1-x} = 32^x$       (d)  $2^{2x} = 0.5^{1-x}$

6. Solve the following equations for x:

(a)  $4^{x-1} = 8$       (b)  $64^x = 32$       (c)  $27^{2x} = 9$       (d)  $100^x = 1000$

(e)  $(2^{x-1})^{x-2} = 1$       (f)  $8^{2+x} = 16^x$       (g)  $25^{-x} = 125^{x+1}$